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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Greenfield et al.	Attorney Docket No.: SRI1P037
Application No.: 09/938,444	Examiner: Golba, Tara M.
Filed: August 23, 2001	Group: 3644
Title: Container for Explosive Device	Confirmation No. 2212

DECLARATION UNDER 37 CFR § 1.131

Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Gary Greenfield, declare as follows:

1. I, Gary Greenfield, am a co-inventor of the subject matter embodied in the above-identified patent application.

2. I am familiar with the Office Action from the United States Patent and Trademark Office mailed November 26, 2002, in the above-named application.

3. In the Office Action, Claims 1-14, 16 and 18 were rejected under 35 U.S.C. §102(a), as being anticipated by "Portable EOD Total Containment Unit.", NABCO, Inc. ("NABCO").

4. In addition, Claim 15 was rejected by 35 U.S.C. §103(a) as being unpatentable over NABCO and Claims 17 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over NABCO in view of U.S. Patent No. 3,820,435 to Rogers et al. I have reviewed the NABCO reference and the Rogers patent.

5. It is my belief that the explosive container shown in the NABCO reference corresponds to the device developed by the assignee of the present application, SRI, under a Research Agreement with NABCO, Inc. of Pittsburgh, PA.

6. I further believe that the explosive container shown in the NABCO reference corresponds to the device described in U.S. application number 60/178,447, filed on January 27,

2000 (the '447 application). The named inventors on the '447 application, as evidenced by the enclosed copy of the filing receipt, are Paul R. Gefken, James D. Colten, and myself. The enclosed document is a true and accurate copy of the '447 application.

7. Although the '447 application was allowed to lapse, I and others at SRI continued to work diligently on the invention. This work was conducted in the United States. The culmination of this work resulted in the filing of the present patent application.

8. Accordingly, I believe that the present invention predated the publication of the NABCO reference.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code), and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Gary Greenfield

Gary Greenfield

2/13/03

Date

Provisional Patent Application

SPINSAFE – A QUICK ACCESS STORAGE MODULE FOR FULL CONTAINMENT OF EXPLOSIVE BOMBS WITH BIOLOGICAL AND CHEMICAL AGENTS

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SPINSAFE – A QUICK ACCESS STORAGE MODULE FOR FULL CONTAINMENT OF EXPLOSIVE BOMBS WITH BIOLOGICAL AND CHEMICAL AGENTS

TECHNICAL FIELD

This invention relates to the containment of explosive devices upon detonation, and, more particularly, to the full containment of the explosive blast forces together with the full containment of any biologically and/or chemically hazardous agents or materials released thereby.

BACKGROUND

Present explosive containment systems are primarily designed to mitigate the effects an explosive blast. For example, the aircraft hardened luggage container system of U.S. Patent 5,267,665 that primarily directs the blast forces along noncritical pathways while protecting critical airframe and control components and passenger and crew compartments. Similarly, the explosive storage module (ESM) of U.S. Patent 5,248,055 (Fig. 1) provides containment of the blast pressure and fragment debris but allows the pressure buildup inside the ESM to be released slowly without causing a significant external airblast. The release of gas pressure from within the ESM is facilitated by the array of quick-lock assemblies located around the periphery of the ESM door. In that ESM, the internal pressure buildup causes the quick-lock bolts to extend slightly, thus generating a gap between the door and the ESM main body. This gap allows the internal pressure to benignly vent into the atmosphere, but without regard to any agents or materials the escaping air may carry with it.

Other explosive mitigation systems include the use of penetration barriers—i.e., armor—but provide no containment of the blast energy or the disbursement of materials associated with the explosive device.

SUMMARY OF INVENTION

This invention relates to the full containment of the explosive blast forces and the full containment of any biologically and/or chemically hazardous agents or materials released upon detonation. More specifically, one embodiment of the invention provides a portable, lightweight, low-cost, containment unit for use by either military or civilian mobile bomb squads or hazardous materials personnel. In another embodiment, it protects personnel sorting mail or packages or inspecting parcels or luggage at security check points.

The preferred embodiment provides dual containment of explosive products and any biological or chemical agents. Specifically, the inner vessel is designed to provide full containment of the products while the outer vessel provides backup containment. In addition, two sets of O-ring seals are positioned between the inner and outer vessels relative to each other so that dual containment is achieved through rotating the inner vessel 90 to 180 degrees with respect to the outer vessel. In one embodiment the inner vessel can be easily rotated manually to close the containment unit with the simple lever arm. In another embodiment, the inner vessel can be rotated remotely with a motorized mechanical drive system.

In still another embodiment a protective fragment barrier is positioned on the inner surface of the inner vessel to provide additional penetration resistance.

In yet another embodiment, the vessels can be cylindrical, while in still another embodiment the vessels can be spherical. In another embodiment, the invention can be situated in a stationery manner while in yet another, it can be mounted with wheels for portability.

To minimize weight, one embodiment of the invention is that the non-critical sections of the vessel away from the O-ring seals are permitted to deform plastically and critical sections near the O-ring seals are to remain elastic. The vessel sections where the O-ring seals are located can be strengthened with stiffeners to ensure that O-ring compression tolerances are maintained between the inner and outer vessels. Away from the O-ring seals, the vessel may be constructed with a thinner wall. This design philosophy is consistent with a one-time explosion use and will provide the most cost-effective and lightest system.

DETAILED DESCRIPTION OF THE INVENTION

A major advantage of this containment system is to provide dual containment of explosive products and any biological or chemical agents. The inner vessel is designed to provide full containment of the products. The outer vessel provides backup containment. Two sets of O-rings between the inner and outer vessels provide seals to prevent escape of the contents of the containment system.

The containment system of this invention is shown in Fig 2. The containment system consists of an inner (primary) and outer (secondary) containment vessel forming a containment unit. The overall shape of the containment unit may be cylindrical as shown in Figure 2 or spherical. In the side of each vessel is an access port with stiffener rings around it and an O-ring seal. In the open condition, the ports initially line up to provide insertion of the explosive device into the inner vessel (Figure 2a). Rotating the inner vessel relative to the outer vessel moves the ports out of alignment and seals the containment unit (Figure 2b). A lining material positioned toward the inner surface of the inner vessel ensures that the explosive device will not be placed in contact with the wall and which preferably supports the explosive device toward the center of the inner vessel. This lining material may also provide an additional fragment penetration barrier.

The two sets of O-ring seals are located between the inner vessel and the outer vessel. One O-ring is located around the access port of the inner vessel and seals the inner vessel access port against the inside surface of the outer vessel for the closed position shown in Figure 2(b). A second O-ring is located between the inner and outer vessels 90 to 180 degrees from the first O-ring and seals the outer vessel access port against the outer surface of the inside vessel for the closed position. This positioning of the O-ring seals allows full dual containment to be achieved through rotating the inner vessel 90 to 180 degrees with respect to the outer vessel.

The pressure containing vessels are fabricated from materials which may include metals, ceramics, or composite materials such as S-glass, Kevlar, carbon fiber, Zylon, Spectra, from combinations thereof, or from other more advanced materials to reduce cost and weight. For example, the containment unit may be composed of two aluminum vessels or a combination of an inner steel vessel and an outer aluminum vessel wrapped with an inexpensive S-glass high-strength fabric to further reduce the outer vessel weight.

The outer vessel contains one end dome that is permanently afixed to the vessel and one end dome that is removably secured to the vessel. This allows the inner vessel to be placed inside the outer vessel before the end of the outer vessel is fastened in place.

A protective fragment barrier may be positioned inside the inner vessel to reduce penetration of the inner vessel by the explosive device while not increasing the weight of the containment unit. Fabrics, netting or felts made from S-glass, Kevlar, carbon fiber, Zylon, Spectra, or other substances, or foam or sand are among the materials that can be used to form the fragment barrier.

The closure system of the invention provides multiple advantages over conventional inward opening doors on current bomb containment vessels. For example, the containment unit can be closed in a few seconds, and there are no latches to deal with. The containment unit can

be closed with a low amount of force by using thrust bearings to support the lever arm and roller bearings between the inner and outer vessel.

Figure 3 shows the different operational positions of the containment system. Because the containment system is completely functional in either a horizontal or vertical position, it provides extra flexibility for incorporation into existing screening operations for packages or baggage at post offices or airports. Figure 3(a) shows the horizontal operation, where it is adjacent to or part of a package screening table or conveyer belt system. For low-level conveyer belts a few feet off the ground, the containment system can be placed in a cavity in the floor so that the access port is at the conveyer belt level. Figure 3(b) shows the vertical operation position. The containment system is also easily portable when placed on a cart with caster wheels. Thus, it is ideal for use by bomb squads.

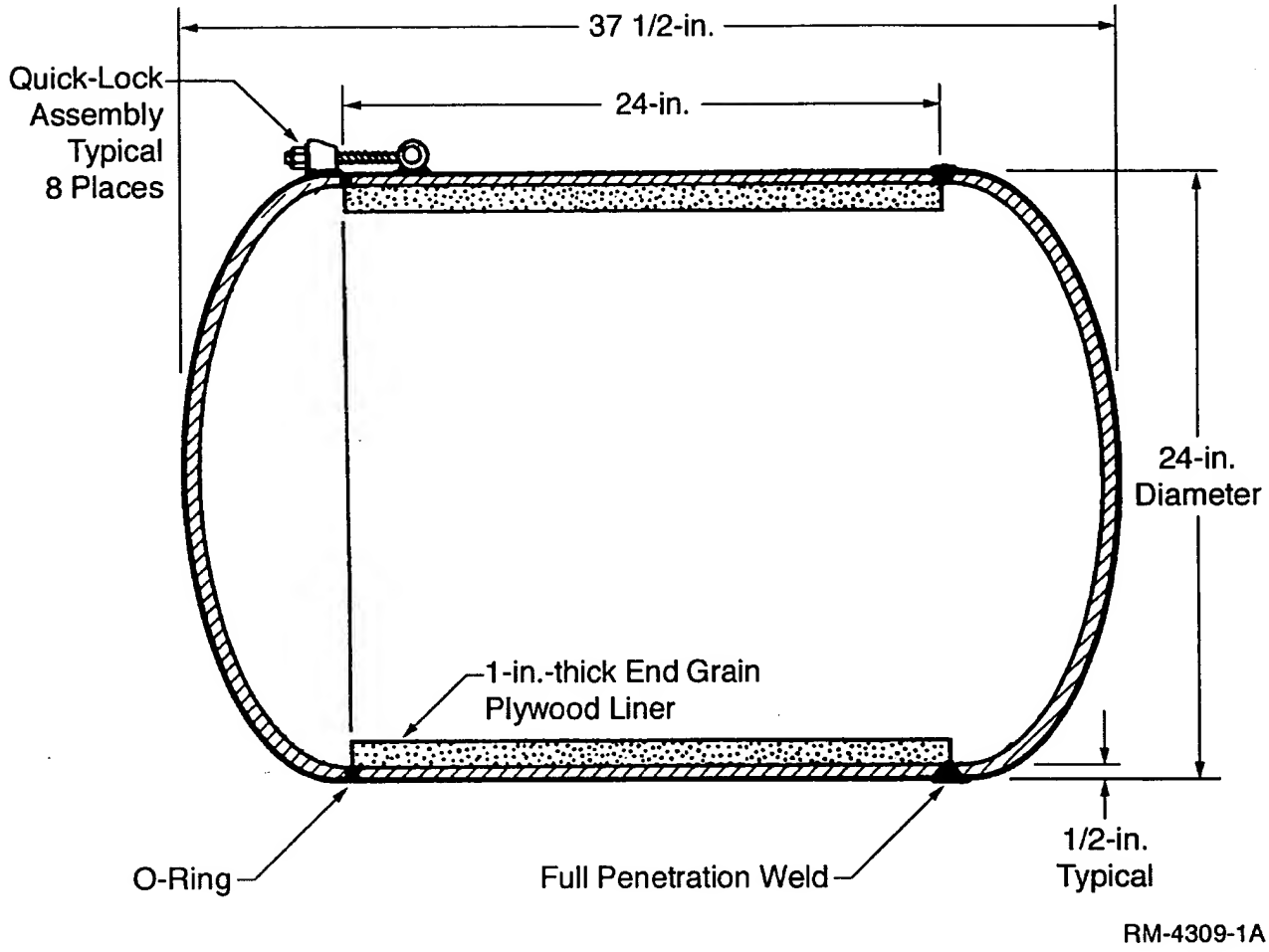

Figure 1. Schematic of current explosive storage module (ESM).

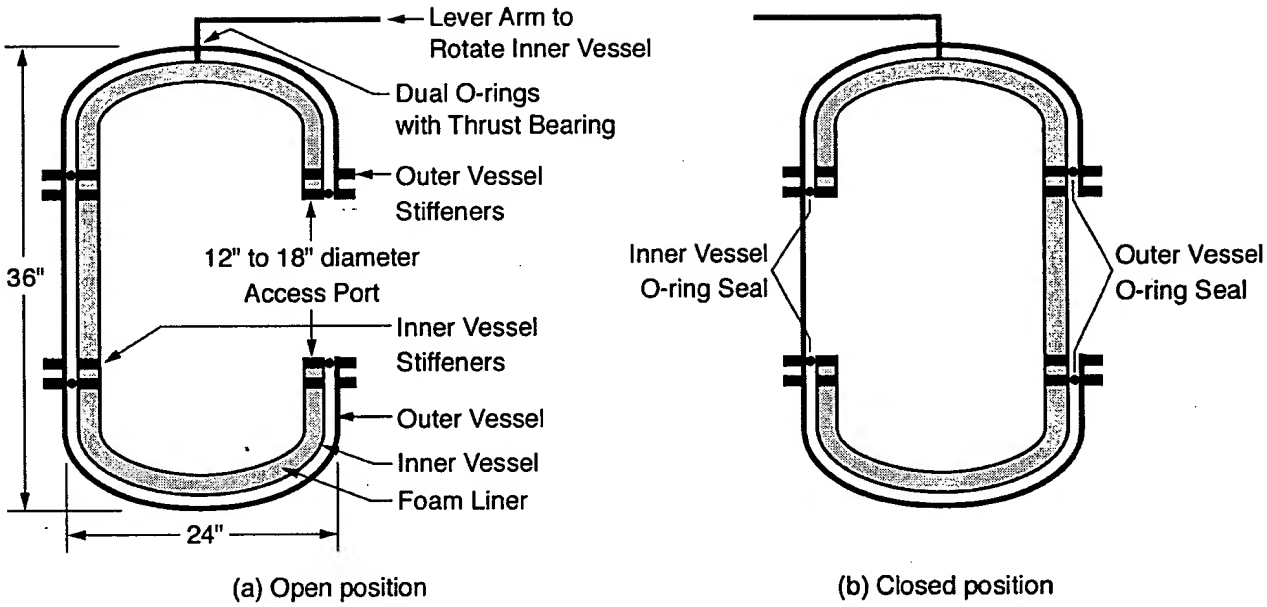

Figure 2. The SRI SpinSafe unit.

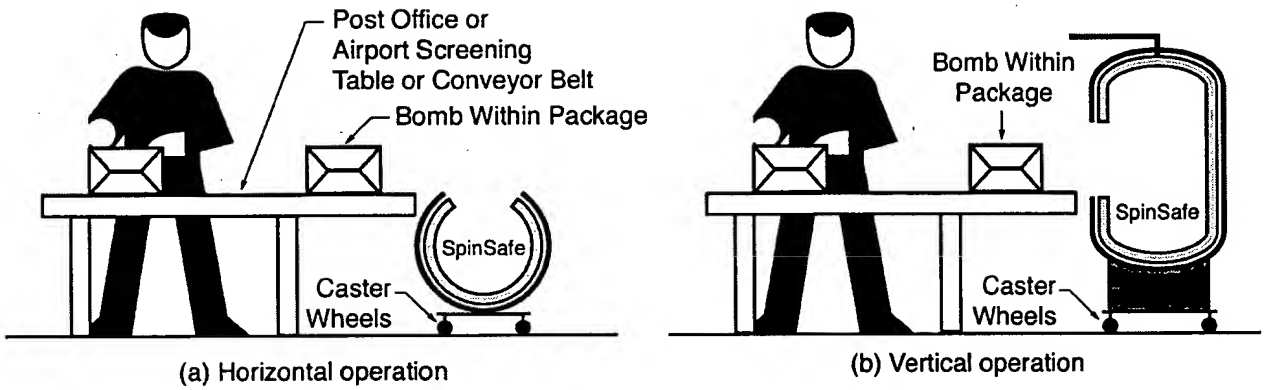

Figure 3. Illustration of SpinSafe operational uses.